AMENDMENTS TO THE SPECIFICATION

Please replace the paragraph on page 1, lines 7-21 with the following amended paragraph:

In recent years, efforts have been made to speed up radio communications systems such as microwave cellular phone systems, radio LAN (Local Area Network) systems, etc. by using ~~multivalued~~ multilevel modulation/demodulation and multiple carriers. However, there is a limitation imposed on the speeding-up efforts due to a narrow frequency band that can be used. For example, if ~~multivalued~~ multilevel PSK (Phase Shift Keying) is employed, then the error rate is degraded and a very high performance level is required for phase noise and frequency stability of the oscillator. If multiple carriers are achieved by OFDM (Orthogonal Frequency Division Multiplexing), then the frequency band is determined by the product of the number of subcarriers and the symbol rate. Therefore, the frequency band needs to be wider as the system Is speeded up. There is known another problem in that since the difference between the peak power and the average power is large, low-distortion transmission amplifiers are generally required.

Please replace the paragraph on page 4, line 11 to page 5, line 9 with the following amended paragraph:

A literature by D. Gesbert (IEEE Journal on Selected Areas in Communications, Vol. 21, No. 3, Apr. 2003) shows 10 wavelengths as the element-to-element interval of four-element antennas for use on base stations in a cellular phone system in the above environment. The disclosed antenna interval as applied to portable terminals and microwave radio communications device for use in offices and homes is not practical in terms of size. Radio systems employing millimeter waves, e.g., in the 60 GHz band, use ASK (Amplitude Shift Keying), FSK (Frequency

Shift Keying), or BPSK (Binary Phase Shift Keying) of a low modulation index, and mostly utilize point-to-point communications with a narrowed antenna beam. If the antenna beam is widened, then the signal quality is lowered or a transmission failure occurs due to multipath interference especially in indoor communications. This is because if the symbol rate is increased, the delay time (the difference between arrival times of direct and reflected waves) is broadened relatively largely as compared with the symbol length, giving rise to an intersymbol interference. In order to lower the symbol rate to avoid an intersymbol interference and maintain high-rate communications, there is employed a radio communication device using ~~multivalued~~ multilevel QAM (Quadrature Amplitude Modulation) or QAM as primary modulation and OFDM as secondary modulation. However, such a radio communications device suffers practical problems because the oscillator is required to have low phase noise characteristics and frequency stability, the transmission amplifier is required to be highly linear, and, in particular, radio communications devices for use in the millimeter wave range are complex, highly costly, and large in size.

Please replace the paragraph on page 8, lines 23-24 with the following amended paragraph:

FIG. 7 is a flowchart of a process of determining a symbol rate and the ~~number of multiple values of modulation~~multilevel modulation number (or index) according to a second variant;

Please replace the paragraph on page 8, lines 25-26 with the following amended paragraph:

FIG. 8 is a flowchart of a process of determining a symbol rate and the ~~number of multiple values of modulation~~multilevel modulation number (or index) according to a third variant;

Please replace the paragraph on page 9, lines 3-4 with the following amended paragraph:

FIG. 10 is a flowchart of a process of determining a symbol rate and the ~~number of multiple values of modulation~~multilevel modulation number (or index) according to a fifth variant;

Please replace the paragraph on page 10, lines 10-21 with the following amended paragraph:

Power supply control circuit 103 controls power supplies whose power is to be supplied to transmitting circuits 101-1 through 101-3 based on a power supply control signal from control circuit 119. Transmission signal processing circuit 104 has, in addition to a modulating function, at least one of a coding function with respect to an MIMO process and a weighting/mapping function. Transmission signal processing circuit 104 includes symbol rate setting unit 117. modulation rate setting unit 118, and modulator 105, and is capable of changing a symbol rate and the ~~number of multiple values of modulation~~multilevel modulation number (or index) according to a control signal from control circuit 119. Transmission signal processing circuit 104 modulates data input to transmitter 100 in modulator 105, and outputs the modulated data as transmission signals to transmitting circuits 101-1 through 101-3.

Please replace the paragraph on page 15, line 21 to page 16, line 2 with the following amended paragraph:

A second variant of the first embodiment will be described below with reference to FIG. 7. The second variant is concerned with a process of determining a symbol rate and the ~~number of multiple values of modulation~~multilevel modulation number (or index). The radio communications device according to the second variantis structurally identical to the radio communication device according the first embodiment, and is capable of changing the ~~number of multiple values of modulation~~multilevel modulation number (or index) and the symbol rate based on the modulation control signal and the propagating situation communication signal.

Please replace the paragraph on page 16, lines 3-14 with the following amended paragraph:

In step 3001, propagation detecting circuit 123 estimates the intensity of multipath interference. If it is determined that multipath interference is weak in step 3002, then the symbol rate is set to a high value and the ~~number of multiple values of modulation~~multilevel modulation number (or index) used to modulate the input transmission data is set to a small value in step 3003. Specifically, symbol rate setting units 117, 122 and modulation mode setting units 118, 123 are set to those values. If it is determined that the multipath interference is strong, then the symbol rate is set to a low value and the ~~number of multiple values of modulation~~multilevel modulation number (or index) used to demodulate the reception signals is set to a large value in step 3004. Specifically, symbol rate setting units 117, 122 are set to the high value or low value of the symbol rate based on the intensity of the multipath interference and the number of values used for modulation and demodulation are set in the modulation mode setting units 118, 123 ~~are~~

~~set to those values~~ based on the intensity of the multipath interference. Using the symbol rate and the ~~number of multiple values of modulation~~multilevel modulation number (or index) thus set, subsequent communications are performed.

Please replace the paragraph on page 16, line 22 to page 17, line 3 with the following amended paragraph:

A third variant of the first embodiment will be described below with reference to FIG. 8. The third variant is concerned with another process of determining a symbol rate and the ~~number of multiple values of modulation~~multilevel modulation number (or index). The radio communications device according to the third variant is structurally identical to the radio communication device according the first embodiment, and is capable of changing the ~~number of multiple values of modulation~~multilevel modulation number (or index) and the symbol rate based on the modulation control signal and the propagating situation communication signal.

Please replace the paragraph on page 17, lines 4-16 with the following amended paragraph:

Initially, in step 4001, the symbol rate is set to a high value and the ~~number of multiple values of modulation~~multilevel modulation number (or index) is set to a low value in symbol rate setting units 117, 122 as initial states. In step 4002, error rate measuring unit 112 measures an error rate. In step 4003, it is determined whether or not the error rate is in a range which is sufficiently allowable in communications. If the error rate is not sufficiently allowable, then the ~~number of multiple values of modulation~~multilevel modulation number (or index) is increased and the symbol rate is set to a lower value in step 4004. Control goes back to step 4002 to

measure an error rate again under new conditions. The symbol rate is lowered and the ~~number of multiple values of modulation~~multilevel modulation number (or index) is increased until the error rate falls within the sufficiently allowable range. Therefore, the symbol rate is lowered until the error rate becomes sufficiently low and the number of multiple values is increased.

Please replace the paragraph on page 17, line 17 to page 18, line 2 with the following amended paragraph:

The above process can be carried out prior to the start of communications. However, even during data communications, the bit error rate, the frame error rate, the packet error rate, and the retransmission request rate may be monitored, and the symbol rate may be appropriately lowered and the ~~number of multiple values~~ multilevel modulation number (or index) may be appropriately increased to make the numerical values of these rates sufficiently lower. Furthermore, the-third variant may include a process wherein if the error rates are sufficiently lowered, then it is determined that the multipath interference is reduced and the symbol rate is increased to increase the transmission rate again. The present variant offers the-same advantages as the first variant, but allows conditions to be set more highly depending on the situation for high-rate transmission.

Please replace the paragraph on page 19, lines 6-13 with the following amended paragraph:

A fifth variant of the first embodiment will be described below with reference to FIG. 10. The fifth variant is concerned with another operation process including a process of determining a symbol rate and the ~~number of multiple values of modulation~~multilevel modulation number (or

index). The radio communications device according to the fifth variant, is structurally identical to the radio communications device according the first embodiment, and is capable of changing the ~~number of multiple values of modulation~~multilevel modulation number (or index) and the symbol rate based on the modulation control signal and the propagating situation communication signal.

Please replace the paragraph on page 19, lines 14-25 with the following amended paragraph:

Initially, in step 6001, the intensity of multipath interference is estimated according to the process described in the first embodiment, for example. If it is determined that multipath interference is strong in step 6002, then the symbol rate is set to a low value and the ~~number of multiple values of modulation~~multilevel modulation number (or index) is set to a high value in step 6003. If it is determined that multipath interference is weak, then the symbol rate is set to a high value and the ~~number of multiple values of modulation~~multilevel modulation number (or index) is set to a low value in step 6004. In this case, the power supplies of those transmitting and receiving circuits which do not contribute to the transmission rate are turned off in order to reduce electric power consumption in step 6005. Stated otherwise, the power supplies of those circuits which do not operate are turned off to reduce electric power consumption.

Please replace the paragraph on page 20, lines 1-8 with the following amended paragraph:

The present variant differs from the fourth variant in that if it is determined that interference is weak, then the-symbol rate is set to a high value and the ~~number of multiple~~

~~values of modulation~~multilevel modulation number (or index) is set to a low value, and if it is determined that the interference is. strong, then the symbol rate is set to a low value and the ~~number of multiple values of modulation~~multilevel modulation number (or index) is set to a high value. The present variant offers the same advantages as the fourth variant, but allows conditions to be set more highly depending on the situation for high-rate transmission.

Please replace the paragraph on page 21, line 16 to page 22, line 2 with the following amended paragraph:

Power supply control circuit 203 controls power supplies whose power is to be supplied to transmitting circuits 201-1 through 201-4 based on a power supply control signal from control circuit 219. Transmission signal processing circuit 204 has, in addition to a modulating function, at least one of a coding function with respect to an MIMO process and a weighting/mapping function. Transmission signal processing circuit 204 includes modulator 205, symbol rate setting unit 217, and modulation rate setting unit 218, and is capable of changing a symbol rate and the ~~number of multiple values of modulation~~multilevel modulation number (or index) according to a modulation control signal. Transmission signal processing circuit 204 modulates data input to transmitter 200 in modulator 205, and outputs the modulated data as transmission signals to transmitting circuits 201-1 through 202-3.

Please replace the paragraph on page 23, lines 14-25 with the following amended paragraph:

Transmitting circuit 201-4 and receiving circuit 207-4 employ any one of ASK, FSK, BPSK, QPSK and DQPSSK as a modulation/demodulation process. Transmitting circuit 201-4

modulates input data into a transmission carrier, and receiving circuit 207-4 demodulates data directly from a reception signal. Such modulation/demodulation is referred to as direct modulation/demodulation. A symbol rate used in transmitting circuit 201-4 and receiving circuit 207-4 is set to a value higher than the symbol rate used in transmitting circuits 201-1 through 201-3 and in receiving circuits 207-1 through 207-3 in the indirect modulation/demodulation mode. The indirect modulation/demodulation mode may employ either ~~multivalued~~ multilevel PSK or ~~multivalued~~ multilevel QAM, or OFDM using ~~multivalued~~ multilevel PSK or ~~muftivalued~~ multilevel QAM for primary modulation.

Please replace the paragraph on page 24, line 1 to page 25, line 2 with the following amended paragraph:

The transmitting and receiving circuits of the radio communications device are set to operate as shown in FIG. 12. Initially, in Step 7001, the power supply of transmitting circuit 201-4 is turned on by power supply control circuit 203, and the power supply of receiving circuit 207-4 is turned on by power supply control circuit 209. In step 7002, the power supplies of transmitting circuits 201-1 through 201-3 are turned off by power supply control circuit 203, and the power supplies of receiving circuits 207-1 through 207-3 are turned off by power supply control circuit 209. Then, in step 7003, error rate measuring unit 212 measures an error rate. In step 7004, propagation detecting circuit 223 determines whether or not the error rate is in a range which is sufficiently allowable or not for communications. If the error rate is sufficiently allowable, then subsequent communications are performed with the above configuration. Specifically, communications are performed using transmitting circuit 201-4 and receiving circuit 207-4. If it is determined that the error rate is not sufficiently allowable, then the power

supply of transmitting circuit 201-4 is turned off by power supply control circuit 203, and the power supply of receiving circuit 207-4 is turned off by power supply control circuit 209 in step 7005. Therefore, transmitting circuit 201-4 and receiving circuit 207-4 are not operated. In step 7006, the power supplies of transmitting circuits 201-1 through 201-3 are turned on by power supply control circuit 203, and the power supplies of receiving circuits 207-1 through 207-3 are turned on by power supply control circuit 209, to make these circuits operable. Finally, a setting process is performed in step 7007 in which radio communications according to the normal MIMO process are set, or a symbol rate and the ~~number of multiple values of modulation~~multilevel modulation number (or index) is ~~are~~ determined according to any one of the processes described above in the first embodiment and the variants thereof.

Please replace the paragraph on page 26, lines 15-26 with the following amended paragraph:

Power supply control circuit 303 controls power supplies whose power is to be supplied to transmitting circuits 301-1 through 301-4 based on a power supply control signal from control circuit 319. Transmission signal processing circuit 304 has, in addition to a modulating function, at least one of a coding function with respect to a MIMO process and a weighting/mapping function. Transmission signal processing circuit 304 includes modulator 305, symbol rate setting unit 317, and modulation rate setting unit 318, and is capable of changing a symbol rate and the ~~number of multiple values of modulation~~multilevel modulation number (or index) according to a modulation control signal. Transmission signal processing circuit 304 modulates data that is input to transmitter 300 in modulator 305, and outputs the modulated data as transmission signals to transmitting circuits 301-1 through 301-3.

Please replace the paragraph on page 30, lines 1-14 with the following amended paragraph:

Power supply control circuit 403 controls power supplies whose power is to be supplied to transmitting circuits 401-1 through 401-3 based on a power supply control signal from control circuit 419. Transmission signal processing circuit 404 has, in addition to a modulating function, at least one coding function with respect to a MIMO process and a weighting/mapping function. Transmission signal processing circuit 404 includes modulator 405, symbol rate setting unit 417, and modulation rate setting unit 418, and is capable of changing a symbol rate and the ~~number of multiple values of modulation~~multilevel modulation number (or index) according to a modulation control signal. Transmission signal processing circuit 404 modulates input data in modulator 405, and outputs the modulated data as transmission signals to transmitting circuits 401-1 through 401-3. Selector 428 has functions to distribute data to transmitting circuits 401-1 through 401-3 and to select the direct modulation mode or the indirect modulation mode as the modulation process.

Please replace the paragraph on page 32, lines 3-10 with the following amended paragraph:

Any one of ASK, FSK, BPSK, QPSK and DQPSSK is employed as the direct modulation/demodulation mode. Transmitter 400 modulates input data into a transmission carrier, and receiver 406 demodulates data directly from a reception signal. A symbol rate is set to a value higher than the symbol rate used in the transmitting circuits and the receiving circuits in the indirect modulation mode. The indirect modulation/demodulation mode may employ any

one of ~~multivalued~~ multilevel PSK or ~~multivalued~~ multilevel QAM and OFDM using ~~multivalued~~ multilevel PSK or ~~multivalued~~ multilevel QAM for primary modulation.

Please replace the paragraph on page 32, line 11 to page 33, line 24 with the following amended paragraph:

The present radio communications device performs a procedure for making settings on the transmitting and receiving circuits as shown in FIG. 15. In step 8001, control circuits 419, 424 set selector 428 to the direct modulation mode, and set selector 429 to the indirect demodulation mode. In this state, communications are performed in the direct modulation/demodulation mode. In step 8002, power control circuit 403 controls the power supply to supply electric power to transmitting circuit 401-1, and power control circuit 409 controls the power supply to supply electric power to receiving circuit 407-1. Therefore, transmitting circuit 401-1 and receiving circuit 407-1 are brought into a state capable of communicating with each other. In step 8003, error rate measuring unit 412 measures an error rate. Propagation detecting circuit 423 records the combination of transmitting and receiving circuits and the error rate. When the measurement of the error rate is finished, power supply control circuits 403, 409 control the power supplies to stop the supply of electric power to transmitting circuit 401-1 and receiving circuit 407-1. In step 8004, propagation detecting circuit 423 determines whether or not the measurement of error rates for all combinations of transmitting and receiving circuits is completed. If there is a combination of transmitting and receiving circuits for which an error rate has not yet been measured, then the combination of the transmitting and receiving circuits is changed, and transmitting and receiving circuits in another combination are energized into operation. Control then goes back to step 8003 to measure an

error rate. If the measurement of error rates for all combinations of the transmitting and receiving circuits is completed, then propagation detecting circuit 423 looks for a combination of transmitting and receiving circuits with the best error rate from the recorded error rates corresponding to the combinations of the transmitting and receiving circuits. If the best error rate is determined as an error rate sufficiently appropriate for communications (low error rate), then subsequent communications are performed with that combination of transmitting and receiving circuits in step 8007. If the best error rate is not an error rate sufficiently appropriate for communications, then control circuits 419, 422 determine that the effect of multipath Interference is strong, and sets selector 428 to the indirect modulation mode and selector 429 to the indirect demodulation mode in step 8008. Finally, a setting process in the indirect modulation/demodulation mode is performed in step 8009 in which radio communications according to the normal MIMO process are set, or a symbol rate and the ~~number of multiple values of modulation~~multilevel modulation number (or index) is ~~are~~ determined according to any one of the processes described above in the first embodiment and in the variants thereof.